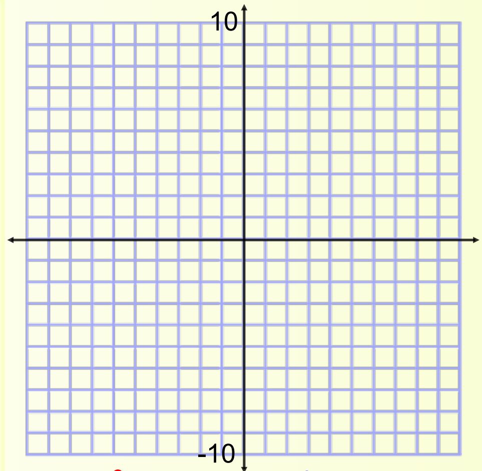
## Alg. 2 Warm Up #10-4

3-119. Graph the two functions below and find all points where they intersect. List all points in the form $(x, y)$.

$$f(x)=x^2-3x-10$$

$$g(x)=-5x-7$$




## HW Questions:

3-113. Add, subtract, multiply, or divide the following rational expressions. Simp your answers, if possible.

a. $\frac{2x}{3x^2+16x+5}+\frac{10}{3x^2+16x+5}$

b. $\frac{x^2-x-12}{3x^2-11x-4}\cdot\frac{3x^2-20x-7}{x^2-9}$

c. $\frac{2x^2+8x-10}{2x^2+15x+25}\div\frac{4x^2+20x-24}{2x^2+x-10}$

d. $\frac{7}{x+5}-\frac{4-6x}{x^2+10x+2}$

$$\frac{\cancel{2}(x^2+4x-5)}{\cancel{(2x+5)}(x+5)}\cdot\frac{\cancel{(2x+5)}(x-2)}{\underset{2}{\cancel{4}}(x^2+5x-6)}$$

$$\frac{\cancel{(x-1)}\cancel{(x+5)}(x-2)}{2\cancel{(x+5)}(x+6)\cancel{(x-1)}}$$

$$\frac{x-2}{2(x+6)}$$

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$$\frac{2(x^2+4x-5)}{(2x+5)(x+5)} \cdot \frac{(2x+5)(x-2)}{4(x^2+5x-6)}$$

$$\frac{2\cancel{(x+5)}\cancel{(x-1)}}{\cancel{(2x+5)}\cancel{(x+5)}} \cdot \frac{\cancel{(2x+5)}(x-2)}{4(x+6)\cancel{(x-1)}}$$

$$\frac{\cancel{2}(x-2)}{\underset{2}{\cancel{4}}(x+6)}$$

$$\boxed{\frac{x-2}{2(x+6)}}$$

d. $\frac{7}{x+5} - \frac{4-6x}{x^2+10x+25}$

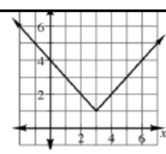
LCD = $(x+5)(x+5)$

* Don't forget to distribute the − to the 2nd fraction!

3-114. Examine the graph of $f(x)=|x-3|+1$ at right. Use the graph to find the values listed below.

a. $f(3)$ b. $f(0)$

c. $f(4)$ d. $f(-1)$




$0 \le x \le 6$

3-115. Use the graph of $f(x)=|x-3|+1$ in problem 3-114 to solve the equations and inequalities below. It may be helpful to copy the graph onto graph paper first.

a. $|x-3|+1=1$ → $x=3$

b. $|x-3|+1 \le 4$

c. $|x-3|+1=3$

$x = 1, 5$

d. $|x-3|+1>2$

$x<2$ or $x>4$

3-116. This problem is a checkpoint for using function notation and identifying domain and range. It will be referred to as Checkpoint 3B.

Given $g(x) = 2(x+3)^2$, state the domain and range, calculate $g(-5)$ and $g(a+1)$, and then find the value of $x$ when $g(x) = 32$ and when $g(x) = 0$.

Check your answers by referring to the Checkpoint 3B materials located at the back of your book.

If you needed help solving these problems correctly, then you need more practice. Review the Checkpoint 3B materials and try the practice problems. Also, consider getting help outside of class time. From this point on, you will be expected to do problems like these quickly and easily.

$$g(a+1) = 2(a+1+3)^2$$

$$g(a+1) = 2(a+4)^2$$

$$= 2(a^2 + 8a + 16)$$

$$= 2a^2 + 16a + 32$$

117. Solve the quadratic below *twice*: once by factoring and using the Zero Product Property and once by completing the square. Verify that the solutions match.

$$x^2 + 14x + 33 = 0$$

$$(x+3)(x+11) = 0$$

$$x = -3, -11$$

$$x^2 + 14x + \underline{49} = -33 + 49$$

$$\sqrt{(x+7)^2} = \pm\sqrt{16}$$

$$x + 7 = \pm 4$$

$$-7 \qquad -7$$

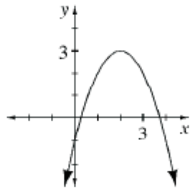
$$x = -7 + 4 = -3$$

$$= -7 - 4 = -11$$

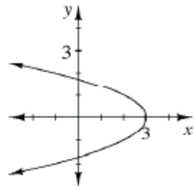
3-118. Match each graph below with its domain.

a. D: All values of $x$ b. D: $x > -2$ c. D: $x \le 3$

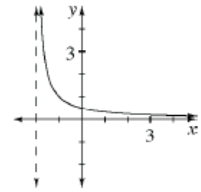
1)



2)



3)



3-120. Simplify each expression.

a. $\frac{1}{x+2}+\frac{3}{x^2-4}$ b. $\frac{3}{2x+4}-\frac{x}{x^2+4x+4}$

c. $\frac{x^2+5x+6}{x^2-9}\cdot\frac{x-3}{x^2+2x}$ d. $\frac{4}{x-2}\div\frac{8}{2-x}$

3-121. Solve $\sqrt{x+2}=8$ and check your solution.

$$\frac{\cancel{4}}{x-2}\cdot\frac{(2-x)}{\cancel{8}\;2}$$

$$\frac{1}{\cancel{x-2}}\cdot\frac{-1(\cancel{x-2})}{2}$$

$$-\frac{1}{2}$$

Week 10 Classwork:
Warm Up
3- #70--->76
#85-87, 88cf (yellow)
#97-100 (own paper)
#110 (tan)

## Simplifying and Multiplying Rational Expressions

1. Notice values of the variable that would make the expression undefined, (denominator $\neq 0$)

2. Rewrite in factored form, look for giant ones and simplify.

## Dividing Rational Expressions

1. Factor everything and flip the second fraction to multiply.

2. Notice where denominator would be undefined both before and after you flip.

## Adding & Subtracting Rational Expressions

1. Factor everything. Find the Least Common Denominator.
2. Multiply each part by a giant one where needed to give them all the same denominator.
3. Combine the numerators by multiplying the numerator all out and combining like terms. Leave the denominator in factored form!
4. Now that it is all one fraction, you can re-factor the numerator and see if there are any giant ones to simplify.

Need more? Read through this page in your book.

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MATH NOTES

Rewriting Rational Expressions

To simplify a rational expression, both the numerator and denominator must be written in factored form. Then, look for factors that make a "Giant One" (a form of the number 1) and simplify. Study the examples below.

Example 1: $\frac{x^2+5x+4}{x^2+x-12} = \frac{(x+4)(x+1)}{(x+4)(x-3)} = 1 \cdot \frac{x+1}{x-3} = \frac{x+1}{x-3}$ for $x \neq -4$ or $3$

Example 2: $\frac{2x-7}{2x^2+3x-35} = \frac{(2x-7)(1)}{(2x-7)(x+5)} = 1 \cdot \frac{1}{x+5} = \frac{1}{x+5}$ for $x \neq -5$ or $\frac{7}{2}$

Just as you can multiply and divide fractions, you can multiply and divide rational expressions.

Example 3: Multiply $\frac{x^2+6x}{(x+6)^2} \cdot \frac{x^2+7x+6}{x^2-1}$ and simplify for $x \neq -6$ or 1.

After factoring, this expression becomes: $\frac{x(x+6)}{(x+6)(x+6)} \cdot \frac{(x+1)(x+6)}{(x+1)(x-1)}$

After multiplying, reorder the factors: $\frac{(x+6)}{(x+6)} \cdot \frac{(x+6)}{(x+6)} \cdot \frac{x}{(x-1)} \cdot \frac{(x+1)}{(x+1)}$

Since $\frac{(x+6)}{(x+6)} = 1$ and $\frac{(x+1)}{(x+1)} = 1$, simplify: $1 \cdot 1 \cdot \frac{x}{(x-1)} \cdot 1 \Rightarrow \frac{x}{(x-1)}$

Example 4: Divide $\frac{x^2-4x-5}{x^2-4x+4} \div \frac{x^2-2x-15}{x^2+4x-12}$ and simplify for $x \neq 2, 5, -3$, or $-6$.

First, change to a multiplication expression: $\frac{x^2-4x-5}{x^2-4x+4} \cdot \frac{x^2+4x-12}{x^2-2x-15}$

Then factor each expression: $\frac{(x-5)(x+1)}{(x-2)(x-2)} \cdot \frac{(x-2)(x+6)}{(x-5)(x+3)}$

After multiplying, reorder the factors: $\frac{(x-5)}{(x-5)} \cdot \frac{(x-2)}{(x-2)} \cdot \frac{(x+1)}{(x-2)} \cdot \frac{(x+6)}{(x+3)}$

Since $\frac{(x-5)}{(x-5)} = 1$ and $\frac{(x-2)}{(x-2)} = 1$, simplify to get: $\frac{(x+1)(x+6)}{(x-2)(x+3)} \Rightarrow \frac{x^2+7x+6}{x^2+x-6}$

Note: From this point forward in the course, unless specifically asked, you may assume that all values of $x$ that would make a denominator zero are excluded.

And this:

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MATH NOTES

## Adding and Subtracting Rational Expressions

In order to add and subtract fractions, the fractions must have a common denominator. One way to do this is to change each fraction so that the denominator is the **least common multiple** of the denominators. For the example at right, the least common multiple of $(x+3)(x+2)$ and $x+2$ is $(x+3)(x+2)$.

$$\frac{4}{(x+2)(x+3)}+\frac{2x}{x+2}$$

The denominator of the first fraction already is the least common multiple. To get a common denominator in the second fraction, multiply the fraction by $\frac{(x+3)}{(x+3)}$, a "Giant One" (a form of the number 1).

$$=\frac{4}{(x+2)(x+3)}+\frac{2x}{x+2}\cdot\frac{(x+3)}{(x+3)}$$

Multiply the numerator and denominator of the second term.

$$=\frac{4}{(x+2)(x+3)}+\frac{2x(x+3)}{(x+2)(x+3)}$$

Distribute the numerator, if necessary.

$$=\frac{4}{(x+2)(x+3)}+\frac{2x^2+6x}{(x+2)(x+3)}$$

Add, factor, and simplify the result.

$$=\frac{2x^2+6x+4}{(x+2)(x+3)}=\frac{2(x+1)(x+2)}{(x+2)(x+3)}=\frac{2(x+1)}{(x+3)}$$

HW: 3 - CI

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Chapter 3 Test: Tuesday